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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/510,482	04/19/2005	Yet-Ming Chiang	14952.0307	7450

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EXAMINER	
HAIDER, SAIRA BANO	
ART UNIT	PAPER NUMBER
1796	
MAIL DATE	DELIVERY MODE
06/24/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/510,482	CHIANG ET AL.	
	Examiner	Art Unit	
	SAIRA HAIDER	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 March 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-49* is/are pending in the application.

4a) Of the above claim(s) *34-49* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. The rejection have been maintained and altered to reflect the amended claims.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1, 3-9, 11, 13, 15-18, 19, 21-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Ruoff et al. (US 5,547,748) as evidenced by Valencia et al. (J. Phys. Chem.).

4. Ruoff discloses the encapsulation of metal carbides inside multilayered polyhedral shells of carbon (nanoencapsulates), the resulting nanoencapsulate materials have uses as composite materials (abstract). The outer diameter of the nanoencapsulate is between 5nm and 1000nm (col. 2, lines 37-39). The nanoencapsulates comprise nested fullerenes (col. 7, lines 39-43). Ruoff discloses that the nanoencapsulates comprise a metal or metal carbide as the core material, wherein the core material fills or partially fills the innermost voids of the nanopolyhedral (col. 4, lines 10-14). Thus, it is clear that the carbon nanoparticle shell entirely covers the core material, hence meeting the claim limitation regarding the shell covering at least 50% of the surface of the core. Ruoff discloses that there about 30 carbon layers in the shell of the nanoencapsulated, wherein the layer spacing between each of them is 3.42 Angstroms, thus meeting the claim limitation regarding a particle comprising a substantially densely packed carbon nanoparticles (col. 5, lines 10-19). Ruoff discloses a nanoencapsulate comprises a metal carbide core and a clusters of single layer nanotubes arranged about the core, wherein the nanotubes extend radially outwards from the core, the core is approximately 28nm in diameter and the outer diameter (defined by the nanotubes) is approximately 90 nm (col. 10, lines 20-26). Thus it is clear that the nanoencapsulate is at least 2% by volume

carbon nanoparticles and the shell has a thickness greater than 2.5nm. In reference to the claim limitations which specify the intended use of the claimed particles, it is noted that the Ruoff reference discloses a variety of applications for the nanoencapsulates including applications in material science, chemistry, medicine and biotechnology (col. 10, lines 50-54). The statements in the preamble reciting the intended use of the claimed invention have been evaluated to determine whether the intended use results in a structural difference between the claimed invention and the prior art, it is the examiners position that a structural difference does not exist. Specifically, the intended use of the core-shell particle in a composite abrasive particle, structurally reinforced composite, electrochemical storage medium or hydrogen storage medium fails to result in a structural difference between the claimed invention and the prior art. Thus, since the prior art structure is capable of performing the intended use, then it meets the claim. See MPEP § 2112.

5. In reference to the newly added limitation regarding the chemical attachment of the carbon nanoparticle to at least a portion of a surface of the core, it is noted that this limitation is considered an inherent property of the claimed product. Since the prior art teaches the identical chemical structures (carbon nanoparticles with a core metal carbide), the properties applicant discloses and/or claims are necessarily present. *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The burden shifts to the applicant to show an unobvious difference.

6. The chemical attachment of the carbon nanoparticle to at least a portion of the metal carbide core is evidenced by the Valencia et al. reference. Valencia discloses that endohedral fullernes encapsulated with metal carbides are chemically bonded via charge transfer from the metallic cluster (for example a metal carbide) to the carbon cage (abstract, Scheme 1). Wherein Ruoff recognizes that the nanoencapsulated is nested polyhedral shells, wherein the polyhedral particles are nested fullerenes (col. 7, lines 38-48). Accordingly, it is clear that the metal carbide encapsulated

multilayered polyhedral shells of carbon disclosed by Ruoff possess the claimed chemical bond between the core and shell materials.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 2, 14, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruoff et al. (US 5,547,748) in view of Ma et al. (Journal of Materials Science).

9. Claims 2, 14, and 20, specify the metal carbide as silicon carbide, Ruoff discloses a variety of suitable core metal carbide materials, but fails to disclose silicon carbide. Thus attention is directed to the Ma et al. reference. Ma discloses carbon nanotubes-nano-SiC (silicon carbide) ceramic. Wherein nano-SiC powders and carbon nanotubes are combined to form a composite having increased bending strength and fracture toughness as compared to monolithic SiC ceramic. Ma recognizes that the CNT (carbon nanotubes) can feasibly be utilized as nano-size reinforcement in ceramics (abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to encapsulate silicon carbide in the nanoencapsulates of Ruoff in order to produce a reinforced SiC composite with improved bending strength and fracture toughness.

10. Claims 10, 12, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruoff et al. (US 5,547,748).

11. The claims specify a metal or metal oxide coating on the carbon nanoparticles, Ruoff discloses derivatizing the surface of the nanoencapsulates by applying various compounds to the

exterior of the nanoencapsulates (col. 11, lines 8-60). Wherein Ruoff fails to disclose metal or metal oxide compounds as suitable surface compounds, however, Ruoff discloses the use of iron oxide particles in floppy disks (col. 12, lines 18-24). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to coat the surface of the nanoencapsulates with a metal oxide compound thus resulting in the formation of magnetic material suitable for use as magnetic recording media.

Response to Arguments

12. Applicant's arguments filed 3/21/2008 have been fully considered but they are not persuasive.

13. Applicant has argued that the product of Ruoff fails to have the claimed chemical bond between the shell and core. In response, attention is directed to the rejection above wherein the examiner has explained that the claimed property is inherent to the product of Ruoff.

14. Applicant has argued that the Ruoff reference fails to disclose substantially densely–packed carbon nanoparticles. In response, attention is directed to the rejection above wherein the examiner has cited the section of Ruoff which discloses the high number of carbon layers present in the nanoencapsulate.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the

THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAIRA HAIDER whose telephone number is (571)272-3553. The examiner can normally be reached on Monday-Friday from 10am-6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on (571) 272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Randy Gulakowski/
Supervisory Patent Examiner, Art Unit 1796

Saira Haider
Examiner
Art Unit 1796